CalPERS 2010 Environmental Initiative Update:
2009 Energy Efficiency Plan Analysis Methodology

This document explains the methodology and calculations in the attachment "Energy Efficiency Plan Analysis."

General Methodology

Core investment managers were asked to report electricity and natural gas usage for all properties held with CalPERS for all of 2009. Buildings acquired or sold in 2009 are excluded from the analysis, as partial-year data would not accurately represent a property's energy profile for a full 12-month period. The balance of the assets is analyzed.

Information pertaining to square footage and 2009 energy use is listed for each property, and sorted by manager, on the "Property Summary" pages. Electricity was reported in kWh by managers. Gas, reported in several different metrics, is converted to Btu's for this analysis.

Using this information, each property type is analyzed based on a metric selected for appropriateness to the property type and availability of complete portfolio data. The metrics used are as follows (note that multifamily, industrial, and retail properties' square footages are not adjusted for occupancy, since occupancy levels do not significantly affect common area energy consumption in these property types):

- Office – total energy usage per occupied net rentable square foot
- Multifamily (Mid/High-Rise) – common area energy usage per net rentable square foot
- Multifamily (Garden Style) – common area energy usage per net rentable square foot
- Industrial – common area energy usage per net rentable square foot
- Retail (Enclosed Mall) – common area energy usage per net rentable square foot
- Retail (Open Air Center) – common area energy usage per net rentable square foot

"NRSF" is used to abbreviate "net rentable square foot" throughout this analysis. Several industrial and retail properties that have no common area energy meters *or* are not able to delineate common area energy usage from tenant usage are excluded from the analysis.

The summary of each manager's electricity use from year to year is presented in the table "Electricity (kWh) Breakdown by Manager" on the "Manager Summary" page. The summary of each manager's natural gas use from year to year is presented in the table "Gas (Btu) Breakdown by Manager" on the "Manager Summary" page.

Each manager's total energy consumption is summarized in the appropriate "[Manager] Energy Consumption 2004-2009" table on the "Manager Summary – Part 1" page. Data is broken down by year for both gas and electricity. To calculate total energy usage and changes, it was necessary to convert kWh to Btu in order to combine kWh and Btu using a common denominator. This is done using a conversion factor of 1 kWh = 3,412 Btu (per the Energy Information Administration). Electricity use (now in Btu) and gas use (originally in Btu) are added together to yield total energy use for each property type. The following hypothetical example illustrates this methodology:

- If 2004 electric consumption was 10 kWh, that equals 34,120 Btu.
- Assume 2004 gas consumption was 10,000 Btu.
- Therefore, 2004 total energy consumption = 34,120 Btu + 10,000 Btu = 44,120 Btu.
- If 2009 electric consumption was 8 kWh, that equals 27,296 Btu using the conversion factor.

- Assume 2009 gas consumption was 8,000 Btu.
- Therefore, 2009 total energy consumption = 27,296 Btu + 8,000 Btu = 35,296 Btu.
- So comparing 2004 and 2009 data, the energy reduction equals (35,296 - 44,120)/44,120 * 100 = -20%.

Each manager's properties are then weighted based on their proportion of the portfolio, in terms of square feet. The square footage reported for each manager is divided by the total square footage reported by all managers. This percentage is then multiplied by the energy reduction per square foot to yield an accurate representation of total energy change across CalPERS diverse portfolio.

The total weighted energy changes from 2004 to 2009 are presented in the "Overall 5-Year Energy Efficiency Plan Summary" table on the "Portfolio Summary" page. Note that to derive the total change in energy usage from 2004 to 2009, this methodology does *not* sum the percentage savings for each individual year. Rather, the method looks discretely at 2009 consumption as compared with 2004 (the baseline year) consumption. Similarly, each year's progress toward the Energy Efficiency Plan 20% reduction goal is calculated by comparing that year's data to the 2004 baseline. This is shown in the "Energy Consumption Change vs. Baseline Year" table on the "Portfolio Summary" page.

The annual weighted energy reductions (by manager and energy type, as well as for the whole portfolio) are presented in the "Annual Change" tables on the "Portfolio Summary" page. These tables show reductions realized in 2005 (achieved compared to the year 2004), 2006 (compared to 2005), 2007 (compared to 2006), 2008 (compared to 2007), and 2009 (compared to 2008).

It is important to note that it is possible for the percentage total energy reduction to be a larger number than both the electricity and natural gas savings. This is due to the constantly shifting nature of the portfolio in terms of total square footage and the fuel mix: whereas all buildings use electricity, only a portion of buildings use natural gas; if these natural gas buildings are bought and sold, the fuel mix of the portfolio changes. When the natural gas savings are calculated independently of other fuel types, only the square footage of those buildings that use natural gas is included; this shows the relative efficiency from year to year for natural gas use. However, when *total* energy use is calculated, fuel type does not matter – total Btu's (including both natural gas *and* electricity) is divided by total square footage. This way, the energy efficiency (and carbon footprint) of the whole portfolio is calculated regardless of fuel source – a more accurate representation of whole-portfolio performance – but this methodology also can cause total energy savings to be larger than the individual savings of either electricity or natural gas. To see this effect in a simple example, a sample portfolio is shown at the end of 2008 and 2009:

	2008 Portfolio	**2009 Portfolio**
Total SF	10,000,000	18,000,000
SF with Natural Gas	3,000,000	4,500,000
Total kWh of Electricity Used	180,000,000	288,000,000
Total Therms of Natural Gas Used	2,000,000	2,700,000
kWh/SF	18	16
Therms/SF (for buildings that use natural gas)	0.667	0.60
Total Energy Use (Btu/SF*)	81,416	69,592
Electricity Change (kWh/SF)	-11.11%	
Natural Gas Change (therms/SF)	-10.0%	
Total Energy Change (Btu/SF)	-14.52%	

*1 kWh = 3,412 Btu
1 therm = 100,000 Btu

Where energy consumption is reported on the "Portfolio Summary" and "Manager Summary" pages, an "N/A" signifies that no data was reported for the energy source during that time period. Where *changes* in energy consumption from year to year are reported on the "Portfolio Summary" and "Manager Summary" pages, an "N/A" signifies that data was not reported in the previous year; hence there is no baseline for comparison. For example, 2005 was used as CommonWealth Partners' baseline year, as it was the first year for which both office assets were reported.

Wherever possible, calculations and formulas have been left in the spreadsheet to provide complete transparency into the data analysis. Further, the raw data used for the analysis will be provided to CalPERS in the form of each manager's survey response and other documentation.

Manager-Specific Notes

Most of Miller's portfolio is owned with joint venture partners. Miller makes every effort to respond to CalPERS information requests, but does not have direct access to energy consumption data (as it is controlled by the JV partners). The analysis therefore excludes all of the Miller properties that are either owned in joint ventures with or managed by Simon Property Group, who did not break out common area energy use. Additionally, another Miller property, Scottsdale Fashion Center, had major renovation work and an addition built in 2009. This work had the effect of greatly inflating Scottsdale's energy use, and thus the property was not included in the 2009 analysis.

Several minor adjustments to Miller Capital's total reported square footage for previous years were made in the 2009 report to more accurately reflect net rentable square footage. These changes had a small effect on previous years' data.

The following notes are copied from earlier reports as additional background information, as they continue to apply to the 2009 report:

- BlackRock and GID's multifamily portfolios are broken down into two categories: high/mid-rise buildings and garden-style communities. Similarly, Miller and First Washington's retail portfolios are divided into two categories: enclosed malls and open air centers. Thus a shift in portfolio composition (e.g., toward a larger proportion of open air centers, which use less common-area energy than enclosed malls) has a lower chance of being perceived as a decrease in energy consumption.

    - In the 2007 report, these delineations were not performed for GID and First Washington due to their smaller, more uniform portfolios. Beginning in the 2008 report, these delineations were performed as follows:

        - 2008 was the first year in which GID reported a mid/high-rise asset. Thus 2009 was the first year in which changes in energy consumption could be calculated for GID's mid/high-rise portfolio.

        - It was discovered that one First Washington property, Cedar Park Shopping Center, has over 12,000 square feet of interior common areas. First Washington assets were divided into enclosed malls and open air centers beginning with the 2008 report, and Cedar Park was classified as an enclosed mall because its distribution of square footage and energy usage pattern more closely match those of malls.

- In 2007, First Washington reported data for one wholly-owned property with CalPERS. In 2008, data for eight properties owned in joint venture partnerships was reported. Because the energy use profiles are considerably different for the JV assets, 2008 is selected as the base year for electricity, with changes in energy consumption beginning in 2009. Changes in electricity consumption from 2007 to 2008 are marked "N/A."

- A GID property, "The District," was left out of the aggregate analysis. The property is mixed-use with both multifamily and retail components. The common areas are not sub-metered by space type, thus energy consumption in the multifamily and retail portions of the property cannot be separated.

- BlackRock stated that its former utility bill service provider may not have been supplying the most accurate data for some properties and time frames from 2004 through 2006.

- A Hines property, 111 Washington, has two floors of data center space comprising 76,500 square feet. Thus the property had extremely high energy consumption despite being only 43% occupied. For this reason, the asset was not included in the analysis.

- Hines' increase in gas usage from 2005 to 2007 is due to a switch from electric resistance heating units to gas heating units. This change increased efficiency and decreased energy costs.

- First Washington and GID's portfolios were shifting and no properties had complete energy consumption data over the 2005-2006 reporting period, so 2007 is used as the baseline year for these managers. An aggregate change is calculated for the first time for 2008 versus 2007.

- Two Hines properties, Cottonwood Corporate Center and Station Square, began reporting full energy usage in 2007. Prior submissions were incomplete. To ensure a consistent comparison year over year, these properties' data from prior to 2007 was removed from the analysis.

- First Washington and GID's portfolios were shifting and no properties had complete energy consumption data over the 2005-2006 reporting period, so 2007 is used as the baseline year for these managers. An aggregate change is calculated for the first time for 2008 versus 2007.

- In the LaSalle and RREEF portfolios, either 2004 data was not available, or very small 2004 data sets were provided. For this reason, 2005 is used as LaSalle and RREEF's baseline.

- Only one property was reported for Hines in 2004. For this reason, 2005 was selected as the baseline year for Hines, when the number of accurately reported assets rose to five.

Carbon Equivalencies Methodology

To estimate the change in the carbon footprint of CalPERS real estate investments, the following approach is used.

Using Department of Energy data, the average carbon dioxide (CO_2) emissions associated with the production of one kilowatt-hour of electricity and one Btu of natural gas was identified.

For each manager, the difference from year to year in electricity usage per square foot and natural gas usage per square foot (from 2004 to 2009) is calculated. This number is then multiplied by the square footage reported by the manager in that year. This is done in order to represent the energy consumption differences from year to year while accounting for the fact that the portfolio size varies each year.

The estimated change in electricity and natural gas consumption for each manager is then multiplied by the average CO2 emissions per unit of energy. This results in an estimate of the pounds of CO2 reduced or added each year.

Changes in CO2 emissions are presented on both an annual basis and as an aggregate total since the initiative began. When CO2 is added to the atmosphere, it remains there after the end of the year in which it was emitted. For this reason, when aggregating emission changes, both increases and decreases in CO2 are counted again in subsequent years. To estimate the cumulative pounds of CO2 reduced or added since the 2004 baseline, the following are added together:

(Change in CO2 2004-2005) +
(Change in CO2 2004-2005) + (Change in CO2 2005-2006) +
(Change in CO2 2004-2005) + (Change in CO2 2005-2006) + (Change in CO2 2006-2007) +
(Change in CO2 2004-2005) + (Change in CO2 2005-2006) + (Change in CO2 2006-2007) + (Change in CO2 2007-2008) =
(Change in CO2 2004-2005) + (Change in CO2 2005-2006) + (Change in CO2 2006-2007) + (Change in CO2 2007-2008) + (Change in CO2 2008-2009) =

Total cumulative CO2 change 2004-2009